that "such freedom actually exists;" and that "the very condition for its existence is seen to be the prevalence of that strict causal sequence in nature demanded by the Necessitarians." But although the suggested reconciliation shows all this, it fails to extend to the upholders of Free Will the relief which they most require, for the procuring of which their doctrine was conceived, and for the continuance of which their doctrine is continued, notwithstanding the manifest and manifold absurdities which it involves. That the supposed reconciliation here fails, seems almost too obvious to require showing. The more certainly it can be proved that every volition is the result of definite causes, and therefore that the character—even in that part of it which is formed by all previous volitions—is also the result of definite causes, the less possibility is there of justifying the sense of Responsibility.

Unless it can be shown that a man is responsible for the character of his character it is nonsense to speak of him as responsible for his actions, when these are determined by his volitions, which, in turn, are determined by his character. Can it, then, be shown that a man is responsible for the character of his character? Obviously not, either upon Clifford's view or any other. It is futile to speak of a man as "the architect of his own character"; for, according to the hypothesis before us, he is nothing of the kind: his character has been built up stage by stage, first by hereditary transmission, next by numberless unintentional influences acting both from within and from without, and lastly by numberless acts of volition, every one of which was strictly determined by causes, and therefore was what it was by way of inevitable necessity. It follows, therefore, that the supposed reconciliation between Free Will and Necessity tends rather to emphasise than to diminish the difficulty; it shows more clearly than ever that the sense of Responsibility, and the correlative sense of Praise or Blame, are alike incapable of any logical justification. No doubt the sense of Responsibility, the love of Praise, and the dread of Blame act as powerful motives to volition; but this fact clearly does not justify either the feeling of responsibility in him who acts, or the feeling of approval or disapproval in him who observes.

But it is of importance also to see that it is quite as impossible to justify these feelings by the doctrine of Free Will as it is by the doctrine of Necessity. For if volitions are uncaused, or but partly and irregularly caused, it is clear that neither moral responsibility, nor praise, nor blame can attach to the unfortunate man whose actions are not guided even by the hand of Providence, but occur by way of inexplicable caprice.

What, then, it cannot but be asked, is the psychological explanation of these deeply-rooted feelings of Responsibility, Praise, and Blame, which can never be eradicated by any evidence of their irrationality? To me it appears the only answer is that these feelings have been gradually formed as instincts, which, while undoubtedly of much benefit to the race, are destitute of any rational justification. GEORGE J. ROMANES

The Inevitable Test for Aurora

IN NATURE, vol. xxii. p. 33, is an implication, if not also a declaration, that the limits of height in the atmosphere, at which the *Aurora Borealis* both can, and cannot, appear, have been ascertained by those world-respected scientists, Messrs. Warren De La Rue and Hugo W. Müller, F.R.S.S. both. The skill of their experiments, the sufficiency of their exhausting apparatus, and the power of their unequalled chloride of silver battery are beyond all question; and they did, without doubt, ascertain in a very complete manner at what particular degrees of rarefaction of certain glass vessels, their electric discharges therein, took such and such appearances.

But what proof do they give that those appearances were aurora?

They mention carmine-coloured discharges in the denser air, salmon-coloured in more rarefied, and pale milky white in the highest rarefaction of all. But those colours, as judged of merely by the eye, are little proof in themselves of the presence of one and one only out of a number, of different things, elements, or manifestations somewhat similarly coloured. So that although I would not presume to be too confident of the sufficiency of the test I am about to set before those eminent men, still, as I was obliged to have the honour of presenting it to that admirable electric philosopher, M. Gaston de Planté, of Paris, three years ago, when he described with his equally wondrous collection of "secondary" galvanic-battery pots and currents of terrific intensity, the *aurora-like* effects it produced—impartial justice demands the same test to be presented now to our best physicists on the west of the British Channel.

Now the test is simply this: did the F.R.S.S. gentlemen see in their electric lights the late M. Ångström's one citron line of aurora?—that line being so invaluable an indication of aurora's presence, though hitherto uninterpreted (see Rand Capron's laborious book of Auroræ[1]); and without which strange linear hieroglyph written from Creation most legibly on its forehead, no aurora has ever yet been seen by mortal man properly equipped for the occasion. And, inasmuch as the learned F.R.S.S. speak of so many variations of red—as carmine, rose, and salmon colours of various kinds—while I had the opportunity of calling attention in NATURE in 1872 to the remarkable fact that *maugre* all the violent variations of auroral red to the eye on that occasion, there was only one and the same red line in the spectroscope through every one of them—did the London scientists see that unique red auroral line manifesting itself through all their various artificial reddish tints; or, had each tint a line or lines peculiar to itself; or was there no red line whatever to be seen, though they looked for it never so earnestly; or is that crucial part of their experiment described elsewhere than in NATURE, vol. xxii. p. 33? PIAZZI SMYTH

15, Royal Terrace, Edinburgh, May 17

Variability of 60 Cancri

I FOUND the above to be a red star in 1874, and the Rev. Mr. Webb, in the same year, made independently a similar observation. It appeared to me of 8 magnitude, as it did also to Mr. Webb. It is numbered 212 in my *Red Star Catalogue*, where, considering Argelander's previous estimate of about 6 mag., I remarked that it might be variable. This appears now certain, as on April 27 of the present year, and again on May 17, I found the star to be 5 mag. and red-orange in colour. Dr. Copeland, of Dunecht, replying to a letter on the subject, informs me that on referring to various authorities, he finds estimates of the star's magnitude from 5 by Lalande to 7 by Bessel, and in W. B. it is marked 8. As I have seen it in both extremes, the recorded differences cannot be ascribed to inaccuracies in different observers, and I must regard the star as a remarkable variable well worth special notice. It is now passing away from us, but I saw it so late as May 17 in very bright twilight, and its proximity to *Alpha* gives facilities for estimations of colour and magnitude.

Millbrook, Tuam, May 21 JOHN BIRMINGHAM

Notes of the Cuckoo

I REMARK that all the cuckoos here intone in a minor key, except one, who alone does not flatten the 3rd of the tonic. The key is in all cases precisely D of concert pitch, as proved by a tuning-fork, and the first note is F on the fifth line. In quality of voice *the Major* is not equal to the others, while he affects a certain jerkiness of style that in no small degree deteriorates his performance. It also wants the plaintive effect of the minor key. I confess I am not very learned in these matters, and a major cuckoo may not be so rare a bird on the earth after all; but I do not recollect ever having noticed one before. All the other cuckoos that I have remarked were *minors*, and, whatever may be the reason of the distinction, I cannot, at least, regard it as connected with difference of sex.

Some years ago I wrote to NATURE concerning a cuckoo who used to surprise me with a third note interposed between the mediant and the key-note. JOHN BIRMINGHAM

Millbrook, Tuam, May 21

Fall of Dust

EXTRACT from a letter to Sir B. C. Brodie, dated May 1:—

Campagne, Montfeld, Mustapha Supérieur, Alger

I WRITE to-day just to enclose you some curious red dust which fell all over Algiers last Saturday (April 24), the air quite still, and sky of a curious orange colour, everything looking as though seen through a yellow glass. The next morning this powder was swept up in large quantities in our court, all the flat roofs being also covered, and the flowers quite spoiled. It fell again the two following days, but rain followed and turned it

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[1] "Auroræ and their Spectra," by J. Rand Capron, F.R.A.S. (London: E. and F. Spon, 46, Charing Cross, 1879.)

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into mud, which stained our whitewashed walls a reddish brown. I see that it fell in Sicily on March 29 and 30. . . . It is quite a different colour from the dust the sirocco occasionally brings us.

Monkeys in the West Indies

YOU have recently had communications in NATURE (vol. xxi. p. 131 and 371) from two gentlemen residing in the Island of Dominica, in the West Indies, Messrs. Edmund Watt and John Imray, on the incorrectness of Prof. Mivart's statement, in his paper on "Tails," regarding the non-existence of monkeys in these islands.

These gentlemen are quite as much in error as Prof. Mivart in asserting that the only islands where monkeys are to be found are St. Christopher and Nevis, and Mr. Imray especially, who says, "It certainly appears remarkable that no species of monkey should exist in the wild state in any of these islands along the whole range from Grenada to Jamaica," with the exception of the two already named.

Not only are there monkeys in the Island of Grenada, but they exist in large numbers, and enjoy all the wildness that the deep forests of the mountains secure to them.

Riding across the country over the mountain ridges, these animals are frequently to be seen skipping amongst the branches of the surrounding trees, and they have often been shot by sportsmen who have ventured into the "high woods."

Exciting *rencontres* have been met with by those who have gone in pursuit of the monkeys. When one is shot at it sets up a "*houp, houp*," that, like the whistle of Roderick Dhu,—

> ". . . garrisons the glen,
> As if the yawning hill to heaven
> A subterraneous host had given,"

and from all sides you are pelted with nuts and seeds and boughs gathered from the trees by the offended tribe. Should you succeed in maiming or killing one of them, the survivors assume so threatening an attitude that, being as a rule singlehanded, you are quite content to retire from the scene of the contest, consoling yourself with the reflection that discretion is the better part of valour.

It is even difficult to secure the skin of one of these animals, for if there are numbers present, when one is shot the others bear away their injured brother beyond your reach.

It can therefore be readily understood how difficult it is to obtain one alive. Not long ago, however, I thought I had secured a prize. One of these "natives" was brought into the town for sale. He was such a handsome fellow, and looked so interesting, that I determined to purchase him. What I was particularly struck with was his being so tame, as he allowed me, without moving a muscle, to place my hand upon his head and about his face. Having been called away for an instant, I missed my opportunity, as he was taken by another gentleman who had come up in my absence. That same evening I saw him again, and on a closer examination I discovered the cause of his docility. He was blind! That was the reason he had been caught so easily.

It is not at all to be wondered at that neither Rochefort, Du Tertse, nor La Bat, the three earliest writers on these islands quoted by Mr. Imray, mention the existence of monkeys in Grenada. They had no opportunities of knowing it. La Bat alone travelled about the island a little, but this was only on our western coast, and the Caribs, who might have informed them on this subject and on many others, had been most carefully exterminated by their countrymen. D. G. G.

Grenada, April 27

IN a letter that appeared in NATURE, vol. xxi. p. 371, on "Monkeys in the West Indies," I observed that it seemed remarkable "that no species of monkey should exist in the wild state in any of the West India Islands along the whole range from Grenada to Jamaica," &c. Since writing the above I have discovered that monkeys are abundant in Grenada in the wild state, and that they are very destructive to the growing crops. Mr. Watt (now at Cape Coast Castle), who took exception to Prof. Mivart's statement in regard to the existence of monkeys in the West Indies, called my attention also to this fact.

Have these Grenada apes been introduced, or are they indigenous? is the question, if indeed it be a question. The historic evidence points, I think, conclusively to their introduction, though I have not been able to ascertain the when and the how, as in the case of St. Kitts. The two old French authors quoted in my former letter—Rochefort, 1665, and Du Tertse, 1667—enumerate the mammalia at that time existing in the Antilles as known to them, and Du Tertse was well acquainted with Grenada; but no species of ape is amongst the number.

A letter from Mr. Sclater in NATURE, vol. xx. p. 153, proved that the St. Kitts Monkeys were referable to the green monkey (*Cercopithecus callitrichus*, Geoffr.) of Western Africa. Can Mr. Sclater or any of your readers give similar information regarding the species of the Grenada ape?

I have been informed that apes are also to be found wild in Montserrat.

Sir Robert Schomburgk, in his "History of Barbados," says, with reference to the Quadrumana: "The most interesting [of the mammalia] is the Barbados monkey, now nearly extinct, although formerly so frequent that the Legislature set a price upon its head. I have much to regret, on account of natural history, that my endeavours to procure a specimen for the purpose of determining the species have entirely failed. From the outer appearance of a living specimen I consider it to be *Cepus* [*Cebus?*] *capucinus*, Geoffr., the Say, or Weeper, or a very closely-allied species. It is not likely that it was introduced, as the first settlers found it in large numbers on their arrival."

Prof. St. George Mivart, who stands in the foremost rank as an authority on all such matters, in an article on "The Geography of Living Creatures," in the *Contemporary Review* for February last, makes the following remarks:—"The West Indian Islands, again, are admirably suited for such creatures as apes, yet none are indigenous to that region, though they rapidly increase when they have been introduced." He says in a note: "Trinidad is really a detached part of the continent of South America."

As all the historic facts go to prove that no species of the Quadrumana existed in the Lesser Antilles when first settled, it certainly does appear much more probable that the apes stated to have been found in Barbados by the first settlers had been introduced from Trinidad or the South American continent than that they existed as native to the island. JOHN IMRAY

Dominica, April 24

The Recent Volcanic Eruption in Dominica

I AM indebted to Mr. Thomas Raine, of the Colonial Bank, Barbados, for the following analysis of the volcanic dust which fell in Roseau—the capital of that island—and the surrounding country during the eruption from the crater of the "Boiling Lake" on January 11 in the present year. The analysis was made in the Analytical Laboratory, Barbados, on January 19, by Mr. George Hughes, formerly senior assistant to Dr. A. Voelker, F.R.S., the sample of volcanic dust having been collected during the eruption and forwarded immediately afterwards to Barbados. Mr. Hughes thinks that the dust "has not been exposed directly to the action of fire to any extent, or the percentage of oxide of iron would have been higher and the pyrites less—oxide of iron being one of the products from the combustion of pyrites."

Aluminia	·64
Moisture	3·26
Oxide of iron	·45
Sulphate of iron	14·46
Sulphate of lime	1·42
Carbonate of lime	·39
Magnesia	·32
Alkaline salts, loss in analysis, &c.	·47
Insoluble siliceous matters	78·59
	100·00

EDMUND WATT

Government House, Cape Coast, West Africa, April 23

Cup Stones, Cup-Marked Stones, or Cups and Rings

THE interesting paper on "A Scottish Crannog" in NATURE, vol. xxii. p. 13, is illustrated on p. 16 by an engraving (Fig. 3) which exactly represents the "Cups and Rings" that have long excited the curiosity of anthropologists on Rombald's Moor, near Ilkley, West Yorkshire. These markings, which I have examined within the past week, are on detached flattish rocks of millstone grit, immediately to the south-west of the village of Ilkley, and near to what are known as the Panorama Rocks.

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